UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
ECOSYSTEMS, TRIBAL AND
PUBLIC AFFAIRS

November 2, 2015

Mary D'Aversa
Bureau of Land Management
Idaho Falls District
1405 Hollipark Drive
Idaho Falls, Idaho 83401

Dear Ms. D'Aversa:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act, and the Council on Environmental Quality regulations for implementing NEPA, the U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement for the proposed Rasmussen Valley Mine (EPA Project No. 11-011-BLM).

The DEIS analyzes the impacts of Agrium's proposed phosphate mine located approximately 18 miles southeast of Soda Springs in Caribou County, Idaho. The BLM is the lead agency for the EIS per their administration of phosphate leases, and the Forest Service is a cooperating agency per their authority related to special use authorizations on the Caribou-Targhee National Forest. The analysis includes a Proposed Action and the Agency's preferred alternative- the Rasmussen Collaborative Alternative (referred to in the DEIS as the RCA).

Concerns about phosphate mining in SE Idaho often arise because of impacts to groundwater and surface water due to the potential mobilization of selenium and metals from mine facilities. To address this issue, the RCA contains significant improvements over the Proposed Action by moving the permanent waste storage to locations that are not directly connected to surface water or shallow groundwater. In addition, the RCA avoids storing waste on unstable ground and reduces wetlands impacts by 98 percent. Mining below the water table would not occur.

Overall, we believe that the mine plan and mitigation measures include design features that substantially reduce impacts to natural resources. We appreciate BLM staffs' time in talking with us about a number of questions and issues. The in-person presentation and follow-up discussions provided useful clarifications about the project.

As a result of our review, we believe that while the DEIS includes improvements to the project, it lacks clarity and specificity regarding modeling, degree of impacts, roles and responsibilities, financial assurance, and potential impacts of climate change scenarios on the project. The lack of clarity in the document raises concerns about predictive impacts and project implementation. Therefore, based on our review, we are rating the DEIS as EC-2 (Environmental Concerns- Insufficient Information). The attached comments discuss issues and concerns in more detail. We recommend that they be addressed in the final EIS.

Thank you for the opportunity to review the DEIS. If you need more information or would like to discuss these comments, please contact me at 206-553-1601 or by electronic mail at littleton.christine@epa.gov, or Lynne Hood of my staff at (208) 378-5757 or by electronic mail at hood.lynne@epa.gov.

Sincerely,

Christine B. Littleton

Christine B. Littleton, Manager
Environmental Review and Sediment Management Unit

cc: Bill Volk, BLM Project Lead
Gary Billman, Idaho Department of Lands
Elton Modroo, Idaho Department of Environmental Quality

Enclosures:

1. EPA Detailed Comments
2. EPA Rating System for Draft Environmental Impact Statements

EPA Detailed Comments on the Rasmussen Valley Mine
Draft Environmental Impact Statement

GENERAL COMMENTS

The document provides useful information that assists the reader in understanding the environmental setting and facility layout. Particularly helpful in that regard are figures illustrating mining sequences, reclamation cover designs, and geologic cross-sections; major permits, approvals, and authorizations; a summary of issues carried forward in the analysis, and Appendix A- Environmental Monitoring Plan.

However, the document is unclear regarding degree of impacts from the Proposed Action, impacts to impaired waters, groundwater impacts from the RCA, points of compliance, predictive modeling, financial assurance, and specific roles and responsibilities of the operator and agencies. Also, the document does not clearly emphasize the magnitude of improvements in the RCA, which we believe are deserving of better recognition. Our concerns and recommendations regarding these issues are discussed in the following sections.

Proposed Action

From discussions with BLM staff, it is our understanding that the Proposed Action could exceed groundwater quality and potentially surface water quality standards and, if so, not be approvable. We acknowledge that this is not the case in the Agency's preferred alternative, RCA. However, the document should clearly describe the intensity of impacts to surface water and groundwater from the Proposed Action and compare and contrast the RCA's intensity of effects on the same resources.

For example, the summary of effects in the DEIS states that the Proposed Action would result in negligible, local and short-term impacts to surface water quality. The document also states that the goal of the surface water management system is to prevent exceedances of water quality standards. Details describe how the Proposed Action would minimize effects (e.g., using a cover system) to achieve this goal. Regarding groundwater, the summary states that the proposal would result in moderate impacts to groundwater quality in the local, intermediate, and regional-scale aquifers while conversely stating that overall, effects to groundwater quality under the Proposed Action would be long-term and minor (appears to reach different scale conclusions). The conclusions regarding surface water and groundwater impacts seem to characterize a Proposed Action that could be permitted, which may not be the case.

The Purpose and Need states that BLM and USFS must evaluate Agrium's Proposed Action to ensure that it meets the requirements of the applicable land use plans, laws and regulations and issue decisions related to the development of the lease. As discussed previously, we understand that the Proposed Action may not be acceptable and, if that is the case, it would not meet the purpose and need.

We recommend that the final EIS clearly describe the intensity of impacts of each alternative in a manner that clearly shows comparisons. We also recommend that the final EIS include a discussion of whether the Proposed Action can comply with federal, state and local regulations. We suggest including this in the beginning sections of the document highlighting major issues such as the Proposed Action's potential unacceptable environmental impacts to groundwater and surface water quality. The final EIS should identify whether or not the Proposed Action would meet the Purpose and Need of the project.

Surface Water

Impaired Waters

The project is located within the Upper Blackfoot River Watershed and Angus Creek sub-watershed. The Blackfoot River is a 303(d) listed segment for *Escherichia coli*, temperature, sediment/siltation, and physical substrate habitat alterations (there is an approved TMDL for sediment). Upper Angus Creek is listed for selenium. Federal regulation prohibits the net increase of any pollutant that will cause or contribute to a numeric or narrative water quality standard violation and Idaho's CWA §401 water quality certification states that any certification ensures that the project will not adversely impact impaired waters. The document identifies mine facilities under the Proposed Action that would affect shallow groundwater/surface water. The model predicted that increases of selenium in stream concentrations in the Blackfoot River (303(d) listed Reach 3) would be approximately the same as the method detection limit of 0.0001 mg/L, and therefore, selenium loading to the 303(d) stream segment would not be measurable. The DEIS also states that impacts to the Blackfoot River would be minor and long-term. This characterization does not seem to adequately capture the degree of impacts from the proposal. Also, the DEIS does not address potential additional loading either from run-off or from potential groundwater contribution that would discharge to other impaired waters- Angus Creek (Se and sediment) and Diamond Creek (sediment).

The Executive Summary states that "Impacts to surface water quality would be considered minor to moderate and long term." The text should mention that some of the surface waters being impacted are already 303(d) listed for Se. This is an important distinction and should be mentioned early in the document and specifically, that the Proposed Action would result in an increase loading of Se to waterways that are already listed as impaired and which would be a violation of the Clean Water Act.

We recommend that the final EIS discuss the direct, indirect and cumulative effects of activities with respect to impaired stream segments.

Include a statement in the Executive Summary about the Proposed Action and potential effects to 303(d) listed waters.

Blackfoot River Current Conditions

We are concerned with the adequacy of the surface water characterization, particularly related to selenium. The selenium discussion in the water quality section describes USGS sampling at one station (frequency not specified) for the Upper Blackfoot River since May 2001 and synoptic sampling every May. The text states that exceedances are "mostly in May" and not in months other than April, May, or June. The sampling events are not identified and it appears that sampling has only occurred in May. Although the text states that exceedances are only mostly in May, which could be interpreted that sampling during other periods has occurred. In order to adequately characterize surface water conditions, samples should be representative and capture other periods of the year to determine when elevated concentrations occur annually.

The final EIS should provide additional details regarding surface water characterization and clarify the timing of sampling. We also recommend rewording the statement, "no exceedances were recorded in months other than April, May or June."

Groundwater Quality

Groundwater Impacts at South Rasmussen

While we acknowledge that the RCA has significant environmental benefits over the Proposed Action by not mining below the water table and backfilling P4's existing South Rasmussen pit, we have concerns regarding potential impacts to groundwater from this additional waste at P4's South Rasmussen. The discussion of plumes related to South Rasmussen backfill as predicted in modeling generically states that "In general, the model indicated that impacts to water quality in the Wells formation regional aquifer would be similar to the predicted impacts for the currently approved reclamation plan for the facility." The final EIS should quantitatively assess and provide relevant information (e.g., a summary) of modeled predictions at the South Rasmussen site. Also, it would be helpful to include an additional figure illustrating the impacts to ground water under the two waste disposal scenarios.

The final EIS should quantify the effects at South Rasmussen pit and we recommend including a figure illustrating the additional groundwater plumes.

Points of Compliance

Points of Compliance may be requested by the mine operator under Idaho Department of Environmental Quality's "Ground Water Quality Rule" to the maximum extent practical. The state's policy is aimed at protecting groundwater while allowing mining activities to take place. To implement this policy, the rule allows mine operators to request that DEQ set points of compliance outside the mining area, rather than within the mining area, where they must monitor, sample, and report on ground water and meet the ground water quality standards.

The DEIS includes a table listing permits, approvals, and authorizations including IDEQ's POC authority. It is our understanding through conversations with the BLM, that the RCA and Proposed Action would both exceed groundwater quality standards and therefore, POCs would be necessary to comply with the Ground Water Quality Rule. The document does not indicate that Agrium intends to seek this approval nor does it describe the necessity of POCs for the project or process for acquiring Points of Compliance. Currently as written, it appears that the project would violate IDEQ's regulations and not be protective of groundwater/groundwater-surface water interaction.

The document does not discuss P4's POCs; although, we have learned from discussions with BLM staff that they are designated for P4's pit and that the additional waste from Agrium's Rasmussen Mine under the RCA would increase the groundwater zone of impact while still complying with the requirements. Because the mine operator is required to comply with POCs, we are unclear which party is responsible at the South Rasmussen pit (P4 or Agrium) and how agencies would enforce the requirements. The document should discuss the responsible party for sampling, monitoring, and reporting and how and by whom any corrective actions would be implemented.

The final EIS should further discuss the need and process for POCs at the Rasmussen Valley Mine.

The final EIS should provide information regarding P4's POCs at the South Rasmussen Mine as well as the party responsible for compliance to ensure that groundwater/surface water quality are protected.

Geochemistry

Selenium Mobility

As a result of our review of the section on Environmental Mobility of Selenium, we have questions regarding the interpretation and appropriateness of references. The first sentence of Section 3.1.3.2 states, "Reduced forms of selenium such as selenide (Se^{2-}), selenite (Se^{4+}), and elemental selenium (Se^{0}) have low environmental mobility in water (Seed et al. 2000)." We have two issues with this statement. First, it is incorrect to say that selenite has low environmental mobility in water because selenite is a commonly encountered form of selenium in water and its abundance is determined by the pH and redox conditions present. While selenite may be more likely to react with Fe or Mn oxide minerals or organic matter, this does not necessarily decrease its mobility as these can be mobile in flowing water as dissolved (i.e <0.45 µm) or particulate fractions. The statement that selenite has low environmental mobility in water is also contradicted in a following paragraph where its states "Redox reaction rates for selenium can be rapid (Pickering et al. 1995) with the dissolved species selenite (Se^{4+}) and selenate (Se^{6+}) being readily reduced to insoluble…." indicating that selenite is soluble. Also, from the reference Seed et al. 2000 the EIS cites states, "The Se^{+6} and Se^{+4} valence states form the oxyanions selenate (SeO_4^{2-}) and selenite (SeO_3^{2-}). Se oxyanions are highly soluble and therefore bio-available and potentially toxic (e.g. White et al. 1991)."

Apart from the need to reconcile the interpretation of Seed et al., 2000, the second issue is our concern with using this source in the analysis. This reference consists of a one page conference abstract and was not peer-reviewed. There is a wealth of peer-reviewed literature and books on Se pollution and therefore, the significance of using this source to support the opening sentence on Se speciation is unclear. Also, the research of Seed et al., 2000 was not on the environmental mobility of Se, it is an analytical paper describing a technique that can be used to analyze Se speciation in solid phase samples such as soils, and appears to not involve measuring Se species in water or the differences in environmental mobility.

Overall, we believe these are minor details and may not affect the environmental impacts analyzed in the EIS. However because selenium is one of the main contaminants of potential concern at the site, we believe it is important to provide accurate information associated with the environmental mobility of selenium. Furthermore, inconsistencies as described above generate concerns regarding the quality of information presented in the EIS.

The final EIS should provide clarifying information regarding the mobility of selenium.

The final EIS should discuss the use of references discussed and include any additional sources appropriate for the site.

Characterization/ Representativeness

We have concerns regarding the sampling program and whether or not samples used in the synthetic precipitation leaching procedure test (referred to as SPLP) are representative of the site. We appreciate the document provided, "Baseline Geochemistry Characteristics (Whetstone 2015a)." However, it does not include the information necessary to evaluate the representativeness of the samples selected for analysis. A table showing that these results are representative of the proportions of alluvium/ore at the site would be useful. This could be addressed by including a table showing the thirteen material types at

the mine site, their relative percent volumes; and the relative percent of samples from each of these materials used in the SPLP tests. If the samples used in the SPLP test were not representative of the actual volumes of material at the site, but instead focuses on better characterization of materials suspected of higher metal mobility, then this could be included in the discussion. As the text and supporting information currently reads, it is not easy to identify if the SPLP results are representative of mine materials.

We recommend that the final EIS include additional information necessary to evaluate the representativeness of the samples selected for analysis.

Modeling

General Sensitivity Analysis

The performance of the cover/cap design to protect groundwater resources is dependent on factors such as depth, vegetation root depth, and transpiration rates. The discussion of modeled results in the supporting document BC 2015a states, "In summary, sensitivity of the Alternative 6 model results to the following inputs was tested: Ksat [hydraulic conductivity] of the topmost and second layers, thickness of the topmost and second layers, root growth and depth." It is unclear why the analysis is limited to these three parameters. We believe that it is important to also include parameters related to the precipitation amount and the vegetation cover/transpiration rates, which may also substantially affect the cover performance. Furthermore, the results of the sensitivity analysis are not presented. The document includes Table 5 titled, "Sensitivity Analysis Results Summary;" however, this does not provide the results of a sensitivity analysis. The information instead presents a test of a few different modeling scenarios without a quantitative assessment of the relationship between input and output parameters. There are different ways to approach sensitivity analysis, which are outlined in the EPA document, "Guidance on the Development, Evaluation, and Application of Environmental Models, EPA/100/K-09/003." A suggested approach could be using ratios of percent change in input / percent change in output such that we can evaluate how sensitive the model is to different input parameters

We recommend that the evaluation include a more thorough sensitivity analysis.

Precipitation

We are concerned that the modeling does not sufficiently capture the potential range of precipitation events and therefore, the performance of the cap may differ from predicted. An annual average precipitation value of 23 inches/year was used in the model. The Whetstone, 2014 document describes the maximum precipitation received at Somsen Ranch weather station between 1981 and 2013 as 39 inches/year and from Table 6 the max for this same time frame at Slug Creek was 50 inches/year. Presumably the modeling results are highly sensitive to variations in precipitation input, and a conservative approach here would be to assess the impacts from a year that received elevated precipitation (i.e. the max value of 50 in/year). Even this value may not represent higher end conditions since it is only based on data from the last 33 years. In the Whetsone, 2015 document, it mentions that in the model an "extreme precipitation" value was used of 37 inches/year; however, while this value may be higher than the annual average, it does not represent "extreme" conditions. As mentioned in the text, this amount of precipitation was exceeded in 9 of the last 33 years. Because this model is being used to understand the infiltration of water through the proposed cover systems, it is critical to understand what occurs during years when precipitation amounts are at their highest.

The supporting document BC 2015a mentions that Cover C was developed because the "net percolation rate was unacceptably high" from the other caps. From reading the supporting document, this unacceptable rate corresponds to a percolation rate of 2.4 inches. The preferred alternative cap has a much lower percolation rate (0.14 inches) yet during periods of elevated precipitation (presumably 37 inches/year) this is expected to increase to 1.3 inches. We are concerned that if higher precipitation values were used (i.e. 50 inches/year, based on maximum values measured in the area since 1981), that the percolation rates would increase to unacceptably high levels. The analysis should include potential impacts to groundwater and surface water under these temporary, discrete conditions.

The final EIS should evaluate a more reasonable range of precipitation events, including high run-off events and evaluate the implications on the cover's performance.

Soils

The hydrologic conductivity values for soils are another important input parameter to the model used in estimating loadings to groundwater and surface water. The document BC 2014d provides the analysis of the soil properties, where it describes that ten composite samples were evaluated for the hydraulic conductivity. Table 2 in this document presents the specific composite samples used for each type of cover material. For Pit Growth Medium, there were two composite samples (COMP-1 and COMP-2). In the BC 2015a "Final Cap-n-Cover" report Figure C-1 shows the individual saturated hydraulic conductivity measurements (Ksat). Eight values are shown in this Figure for Pit Growth Medium, presumably from the four separate analyses of each composite of different compaction and moisture contents. There is a wide range in these value, which span approximately four orders of magnitude. With the large range in values, it is unclear how representative the geomean of the conditions would be expected in the field. The conclusion that the cover will perform as expected related to hydrologic conductivity is not fully justified.

We recommend that the final EIS provide additional information regarding hydrologic conductivity and methods used in reaching conclusions.

Vegetation

The EIS should discuss the input values for the vegetation component of the model that were used (i.e. root depth over time, root distribution, leaf area index, and wilting point). The sensitivity analysis was limited to root growth depth while no other variables were assessed. The results indicate that the root growth and depth were important variables affecting the transpiration, runoff, and net percolation rates; however the rationale for selecting the values utilized in the model is not explained.

We recommend that additional vegetation components be considered in the sensitivity analysis and that the document describe the rational for selecting values used in the model.

Financial Assurance

The DEIS includes a section on reclamation and financial assurance and provides general information regarding the process, commitment to approve the financial amount prior to ground disturbing activities, and the periodic review of the adequacy of the bond. However, there is no detail regarding estimated costs or information regarding potential long-term monitoring.

One of the EPA's primary concerns with mining is securing adequate financial assurance for

reclamation, closure and post closure activities. NEPA provides for the disclosure of all information concerning environmental consequences of a proposed action to the public and decision-makers before the decisions are made and before actions are taken. One key aspect that should be discussed is the likelihood that mitigation will be implemented[1]. Although NEPA regulations do not directly refer to disclosure of financial assurances, the amount and viability of financial assurance are key factors in a discussion of whether mitigation will be implemented. Another key component to determining the environmental impacts of a mine is the effectiveness of closure and reclamation activities, including long-term water management. The amount and viability of financial assurance are critical factors in determining the effectiveness of reclamation and closure activities and, therefore, the significance of the environmental impacts.

We recommend that the final EIS analysis disclose the estimated cost to reclaim and close the site in a manner that achieves reclamation goals and post-mining land use objectives. The proposed financial assurance mechanisms should be identified. The analysis should disclose costs associated with implementing the reclamation plan, as well as costs associated with implementing contingency measures to deal with reasonably foreseeable but not specifically predicted outcomes. This is necessary to inform the public and decision-makers of the financial risk to the public posed by conditions at the site. These financial assurances should be in a form that protects the public interest in the event that a company is unable to implement contingency measures or perform long-term operation and maintenance at a closed mine site. The EPA believes that it is critical to anticipate environmental impacts that are reasonably foreseeable, yet not specifically predicted and to have financial assurance mechanisms in place to deal with such contingencies.

The final EIS should include detailed information regarding the cost estimate and bonding instrument.

Climate

The DEIS describes the potential to increase greenhouse gas emissions from construction and operation and the implications on climate change, which, according to the DEIS, would not be different from existing conditions and are lower than the reporting threshold. We appreciate the discussion of GHG emissions and climate; however, the DEIS does not discuss the potential impacts of a changing climate on the project. In 2014, the Council of Environmental released the draft guidance[2] directing federal agencies to consider the effects of GHG emissions and the implications of climate change on the proposal.

For example, the potential changes in precipitation and fire severity may affect the performance of mitigation measures over the long-term and particularly for the cover system. The DEIS assumes a 20 percent water loss due to sublimation from the snowpack, which may not representative of future climate change scenarios where a larger proportion of the precipitation falls as rain instead of snow. Because an evaluation of the precipitation inputs were not included in the sensitivity analysis, it is not possible to evaluate the performance of the cap under changing climate conditions.

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[1] CEQ. 2011. "Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact."
http://ceq.hss.doe.gov/current_developments/docs/Mitigation_and_Monitoring_Guidance_14Jan2011.pdf

[2] CEQ. 2014. "Revised Draft Guidance for Greenhouse Gas Emissions and Climate Change Impacts.
https://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/ghg-guidance

The DEIS excluded stream flow data from year 2011 and explained that it was an anomalously high precipitation event. However, based on precipitation data at Somsen Ranch and Slug Creek weather stations in 2011 the precipitation was 34.5 and 44.7 inches respectively. Precipitation levels at or above this level occurred 3-4 times at these locations since 1981. As such, the high stream flow conditions encountered in 2011 may occur once per decade based on data from the last 30 years. As extreme weather conditions may become more common under future climate change scenarios, the frequency of periods of elevated precipitation as occurred in 2011, may be even more frequent than would be predicted based on past data. Given that rain events on the scale encountered in 2011 occur every 10 years, by what measure is this year considered "anomalous"? 2011 was not a 100-year storm event that can be excluded as being anomalous; similar or larger precipitation levels occur fairly frequently. Given this potential, we believe that data from this year should be utilized in the calculations.

In addition, it would be helpful to model a scenario with greatly reduced vegetation cover given the anticipated increase in the fire interval in the Northwest. The modeling results are based on grasslands in good conditions. However, drought and fires are common in this area, with an average fire frequency of 15-25 years. Including this in the analysis would allow an understanding of how this may impact the infiltration and seepage modeling under different vegetation conditions.

The final EIS should include the implications of a changing climate on the project, particularly in relation to permeant features (e.g., the cover system).

Air

We are unclear about the potential impacts of fugitive dust and, in particular, the potential for impacts to surface water from windborne selenium. The DEIS should discuss an estimate of the distance fugitive dust emissions are expected to travel prior to deposition in order to evaluate the area impacted. This should be contextualized with distance to important surface water resources, such as the Blackfoot River. Also, there is no discussion regarding the Se content of particles that leave the site via fugitive dust emissions. This potential source of loading to area waterways should be mentioned. If deposition of selenium is determined not to be a significant pathways, a statement indicating that this was evaluated should be included.

The final EIS should provide additional information regarding fugitive dust and the potential for windborne contaminants.

SPECIFIC COMMENTS

Executive Summary: Early in the document, the waste locations are described as "downslope of the pit" and "upslope of the pit." This is essentially shorthand to indicate the vulnerability of the locations with regard to their ground water and surface water connections, as well as the stability of the underlying surface. The significance of the difference between these two locations was not immediately apparent. until early in the document, and then perhaps saying that from then on, the terms "upslope" and "downslope" will be used to encompass the complete set of those differences. (The first place I appreciated the significance embedded in the terms was on p 2-39. I recommend moving this explanation into the Executive Summary.)

Page ES-2. A major improvement of the RCA compared to the Proposed Action is that mining would not occur below the water table and thus reducing potential impacts to groundwater. However the DEIS

states that designed ultimate pit depth is controlled by the economic strip ratio. The final EIS should clarify that the mining would not occur below the water table if the RCA is approved.

Page ES-12. The text states that: "The Proposed Action would increase hydrological disturbance...by 1.59%." This is very specific number but referring to a very vague impact. While this is explained in more detail later in the EIS, there should be a brief description/definition of what constitutes a hydrological disturbance (e.g. could be discharge volume, timing, water quality, hydrologic pathways, etc.).

Page ES-14. The text states that the Proposed Action would have "moderate impacts" to groundwater quality. Selenium is mentioned in this paragraph, but not any other specific COPCs. If there are other constituents here that would exceed WQS, they should also be mentioned.

Chapter 2. The text describes the different cover designs; however, it would be very helpful to include a graphic showing the Proposed Action cap and the RCA caps for comparison. The figure could include materials composition and origin, thicknesses, hydraulic conductivities, and resulting infiltration values at the minimum. Also, the RCA includes two cap designs, the Cap C version onsite and the previously-approved cap for the material moved to South Rasmussen. Showing these in a visual form would make it much easier for the reader to understand their characteristics, compared to reading text in multiple locations and flipping back and forth.

Page 2-56, Agency Preferred Alternative. The bullets should also capture the importance of relocating the overburden piles so that they do not overlie unstable ground connected to surface water.

Page 2-76 (Table 2.9-1), Groundwater quality. This table should include additional information regarding potential effects from moving waste to South Rasmussen. We recommend more clearly separated the effects from the RCA and the Proposed Action. Currently, they are described together and it is unclear which effects are being discussed.

Page 3-13. Section 3.1.3.2.1 references a Tetra Tech document prepared for a working group. This is a challenging reference to locate. Please provide an alternative source where information regarding these studies on Se were published.

Page 3-19. A measure of dispersion around the average needs to be included such as standard deviation or standard error in order to identify the variability in the data that was used to generate these averages.

Page 3-20 and Figure 3.1-7. These sections discuss the percent of tested samples; however, the analysis does not describe the proportion of samples based on the lithology of waste. Therefore, this information in itself does not adequately characterize the acid generation potential of the waste as a whole. We acknowledge that acid rock drainage has not been observed in the district and therefore, we suggest highlighting that aspect in the text more and stating that the percentage of samples were not assessed proportionally to the type of waste.

Page 3-10. Provide a reference for the statement "The regional results and the acid base accounting data from the Rasmussen Valley baseline geochemistry study are consistent with the observation that

phosphate mining has occurred in the district for about 90 years with no report of acidic drainage from overburden piles and backfills."

Page 3-47. The text states, "Data from the gain-loss studies indicate that Blackfoot River-Reach 1 is a losing segment under baseflow conditions." The text should clarify that this is during summertime baseflow conditions and acknowledge that the conditions during these two measurement periods (Aug and Sept) may not be representative of conditions encountered during other seasons.

Page 3-84. We are uncertain with what is defined as "plant-available selenium concentrations." We presume that this is referring to only specific species of Se. Please clarify.

Page 3-84. Regarding the statement: "In general, the concentrations of trace elements in soils within the Study Area are within known suitability criteria." This information needs to be reconciled with the statement on page 3-14 which states: "The results of the XRF and ICP-AES/MS analyses indicated that trace metals of potential environmental concern are widely distributed throughout the proposed overburden and ore." Is the main distinction that the soil samples being referred are for samples collected <5 ft depth, whereas the statement regarding overburden is referring to materials collected over deeper depths? Please clarify.

Chapter 4, Plume Maps. Colors could be more distinguishable, especially the two yellows

Figures 4.3-21 and 4.3-22. When reviewing these two figures (South Rasmussen ground water model domain and modeled Se plume in Wells Formation), it is difficult to compare and contrast the groundwater plume with respect to the location of mine facilities because the scale of the figures are different. A clear delineation is necessary to understand the extent of the plume in relation to the facilities. An option might be to add the features at South Rasmussen such as the pit boundaries and pit fill analogous to those in shown in purple lines for Rasmussen Valley (with a different color).

Page 4-7. The SPLP tests use a weakly acidic solution to simulate precipitation chemistry. In contrast the column tests used de-ionized water. As such the column tests may have underestimated the release of some COPCs relative to results that might be observed from column tests where precipitation was utilized. The resulting pH from the column tests was 6.4 to 8.8; which is higher than typical rainwater pH values which can often be below 6. A discussion of how this may have impacted the results should be included in the presentation of this data

Page 4-7. Given the important role redox conditions and pH have in influencing selenium solubility and mobility; what was the pH and redox potential of the head solution used in the column tests?

Page 4-11, Figure 4.1-1. The Rex Chert materials were run for 12 cycles. For some continuants (pH, TDS, Fe) the data from all 12 cycles are shown; however for other constituents (sulfate, Al, Sb, Cd, Cu) only data from 11 cycles are shown. The final data is not presented for these constituents. Please provide this information or discuss why it is not presented.

Page 4-41. It may not be appropriate to take an average of two samples using four different tests. The sensitivity analysis suggests that the model outputs of transpiration and runoff are sensitive to variations in the surface Ksat values; therefore, it may be worth exploring the impacts of the averaging techniques

utilized on the model results. Furthermore, given the variability in the data presented in Figure C-1, it may be appropriate to incorporate median values rather than geomean values? Given the sensitivity of the model output to these input parameters, it is important to identify how variations in the data summarization might affect the results.

Page 4-41. The text mentions that vegetation properties were based on the proposed reclamation seed mixture and literature estimated values, and then eight citations are listed. One of the references lists, "lio and lto 2014", which is not in the references section. Also, some of the references appear obscure (e.g. a MSc Thesis with data from western Oregon). It would be helpful to provide context/discussion regarding how were these diverse literature values were used to decide which value to include in the model.

Page 4-42. Plant transpiration is based on model default values for grass (Arcadis 2014b). Table 2.5-4 shows the proposed revegetation efforts being a mix of grass, forbs, and shrubs. It is unclear how using different vegetation covers would affect the inflation and seepage modeling. Also, it is not clear what density of grass cover is being used in the model simulations and how representative this would be of the eventual vegetation cover conditions at the site.

Page 4-43. Figure C-1 and C-2 in the BC 2015a document show large seasonal variations in percolation and runoff. The values presented in the Table 4.303 of the DEIS are annual average values; however there would be a benefit to capturing the large seasonal variability in this Table as well (e.g., seasonal max values could be added in parenthesis).

Page 4-43. The document should discuss the time period expected for the vegetation to reach "fully mature root systems." We are unclear if this is a few years, or decades. From the sensitivity analysis presented in BC 2015a, the percolation rate was almost an order of magnitude higher during the time period or root development (2 feet) compared to the fully matured conditions of 3 feet.

Page 4-44. The text states that the model "has several enhancements that improve its numerical stability and *ability to solve matrices with steep gradient.*" We are unclear what is meant by this statement. Please reword.

Page 4-47. The different leaching cycles resulted in different concentrations of COPCs; it is not clear which values and the relevance of values selected from these test for incorporation into the groundwater modeling.

Page 4-47. The starting concentrations of COPCs in the groundwater were assumed to be zero. In order to understand the cumulative impacts of this proposed mine, there should also be numbers presented that show the total expected concentrations (pre-existing + mine contributions).

Page 4-56. The text mentions that Al, Cu, and Fe would not exceed applicable standards; however this is based on the assumption of starting concentrations of zero. It is unclear if values would remain below standards if the contributions for Al, Cu, and Fe were added to existing concentrations of these constituents in the groundwater. This comment also applies to Al, Cu, Fe, and Zn in the regional groundwater discussion.

Page 4-73. Regarding the text: "Baseline monitoring data indicate that Angus Creek is a losing stream over its length during most flow conditions." Presumably, this is in reference to the data presented in 3.3-5 which shows the results of gain-loss studies on Angus Creek. It appears that data were only collected from this creek during low flow conditions between August and Oct, with no measurements from the late winter, spring, and early summer when the flows would be much higher. It appears that the baseline monitoring was not collected during a wide range of flow conditions and statements such as "most flow conditions" are not supported by the data. Please clarify this information.

Page 4-73. The assumption that Reach 1 is a losing stream is based on a temporally isolated dataset and this assumption is not particularly conservative. It would be useful to assess Reach 1 as a gaining stream and whether or not this this significantly affect the concentration presented for reach 2 in Table 4.3-11.

Page 4-74. High flow date was excluded from the data as mentioned in our comment under "Climate". If the high flow data from 2011 were utilized in Table 4.3-11 would it result in any of the concentrations exceeding the applicable surface water standards? If so, the higher flow data should be included to provide a more conservative assessment of the impacts to water quality.

Page 4-75. The text states that higher Se concentrations are correlated positively with stream flow, which is reflected in the surface water baseline concentration data shown in Table 4.3-11. However, later in the paragraph, it says that "No increase in Se concentration in streams are predicted under high flow conditions". These two pieces of information seem to be contradictory, with no explanation offered as to why these predictions are counter to what has been observed in numerous field investigations. Please provide clarification.

Page 4-75. It appears that the reference at top of the page to Figure 4.3-7 is incorrect and should be Figure 4.3-12.

Page 4-79. An important feature of the RCA over the proposed action is that it would avoid mining below the water table and avoid groundwater entering the pit. In Figure 4.3-18 the pit and water table are shown for the RCA. In the Rex Chert the water table is shown to be above the maximum depth of the pit, which suggests that water would flow into the pit. However, this is not what is predicted in the text. When the text mentions that mining will not occur below the water table there should be discussion of this in the context of the water table depth shown in the Rex Chert.

Page 4-85. Please discuss the rationale for only considering Se and Mn in the groundwater transport model rather than a wider range of COPCs.

Page 4-92. The text states that modeling predicts that there would be no impacts to shallow groundwater quality under the RCA. However, on page 4-86, it mentions that modeling results predict that Se concentrations occur at levels higher than applicable water quality standards. Please provide clarification.

Page 5-21, Section 5.3.5 discusses the cumulative effects of ground water contamination. It states that impacts would be localized and of limited extent. Because the data presented in the groundwater section of the EIS provides data of predicted concentrations based only on contributions from the mine (i.e. pre-existing concentration set to zero), it is not possible to evaluate these statements quantitatively.

Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections

The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns

EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections

EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory

EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.